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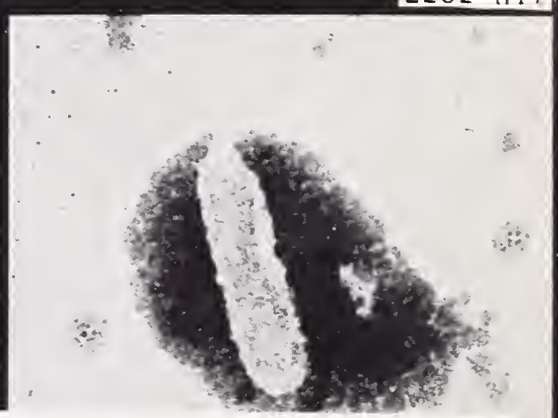
Reserve

PROBLEM - Damaged Pines

2202-H34

CULPRIT - European Pine Sawfly

2202-H17



CONTROLLER — Sertifer Control Virus

2202-H92

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PHOTO STORY No. 5

So , Who Needs Persistent PESTICIDES ???

Forest Service scientists around the country are looking for a "better mousetrap" -- a better way to obtain the benefits of pesticides like DDT, dieldrin, endrin, aldrin, and chlordane without the harmful properties of pesticides to contaminate the environment. Some "better mousetraps" for achieving insect control and for alleviating tree damage are under development.

Better chemical pesticides, for one, are being researched at Forest Service laboratories. For safety, these chemical replacements for the persistent insecticides are being designed to have less residual action and to have little or no effects on other forms of life -- plants, birds, or fish.

Natural control measures are also under scientific investigation. A natural control technique, such as biotic control, will regulate and reduce insect populations without the undesirable side effects of the "hard" pesticides. Male insect sterilization programs, as well as insect virus and bacteria applications, are all biotic control measures.

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NORTHEASTERN FOREST EXPERIMENT STATION UPPER DARBY, PENNSYLVANIA 19082

Scientists at the Northeastern Forest Experiment Station's Hamden, Conn., Insect and Disease Laboratory are engaged in a study of a virus for microbial control of the European pine sawfly (Neodiprion sertifer, Geoff.). This pine sawfly in its larval stages is a voracious devourer of red and Scotch pines. Nibbling away at older needles and stunting tree growth, the pine sawfly takes a heavy toll in Christmas tree plantations from New England to Iowa each year.

There is a natural virus that weakens sawfly populations and brings about their early death. This virus can be controlled. It can be put to work most advantageously in the spring of the year before sawfly larvae have a chance to do their damage. Introduction of the virus will not eliminate an entire population, but will reduce it below damage level and will continue to exert a regulating control from year to year.

In order to determine the efficacy and safety of the sertifer virus, Forest Service scientists undertook the tedious process of obtaining it. Since all insect viruses must be grown in living host tissue, Hamden scientists gathered colonies of insects and established an extensive rearing factory for virus production. Millions of pine sawflies are raised in captivity in special cardboard containers each containing about 2,000 larvae. They are fed their favorite diet -- red pine foliage. But this foliage is doused with virus. In one to two weeks disease builds up and kills the insects.

The dead insects are carefully plucked from the pine twigs. Their virus-infected cadavers are washed, ground up in a Waring blender, sieved, centrifuged, washed, and re-centrifuged. The suspension that results is a crude form of virus. Since it still contains impurities and may contain injurious bacteria, further purification or decontamination is imperative.

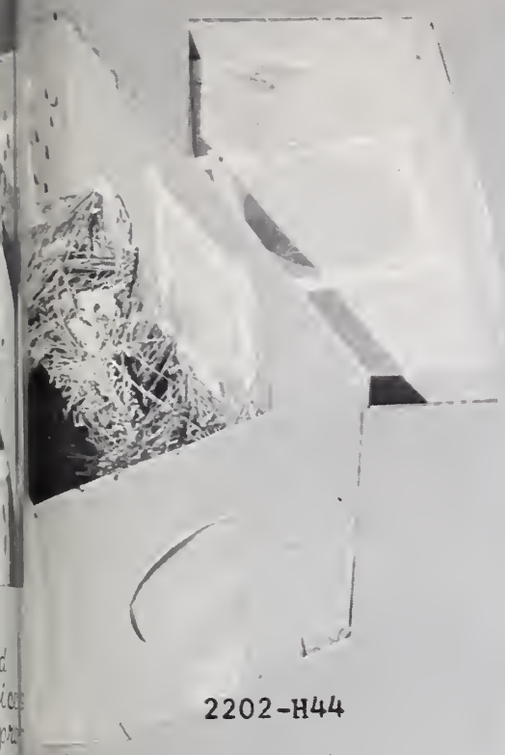
2202-H43

REARING FACTORY: Rows of corrugated cardboard boxes at the Forest Service Saltonstall field laboratory have produced about five million larvae in the box houses about 2,000 larvae.

VIRUS APPLICATION: Larvae are infected suspension of the virus onto pine foliage insect will feed.

2202-H5

HARVESTING INSECTS: Pine sawfly cadavers are carefully picked from the pine twigs to which they are almost glued by the resinous pine material which they have ingested.



2202-H44

three years. Each

2202-H68

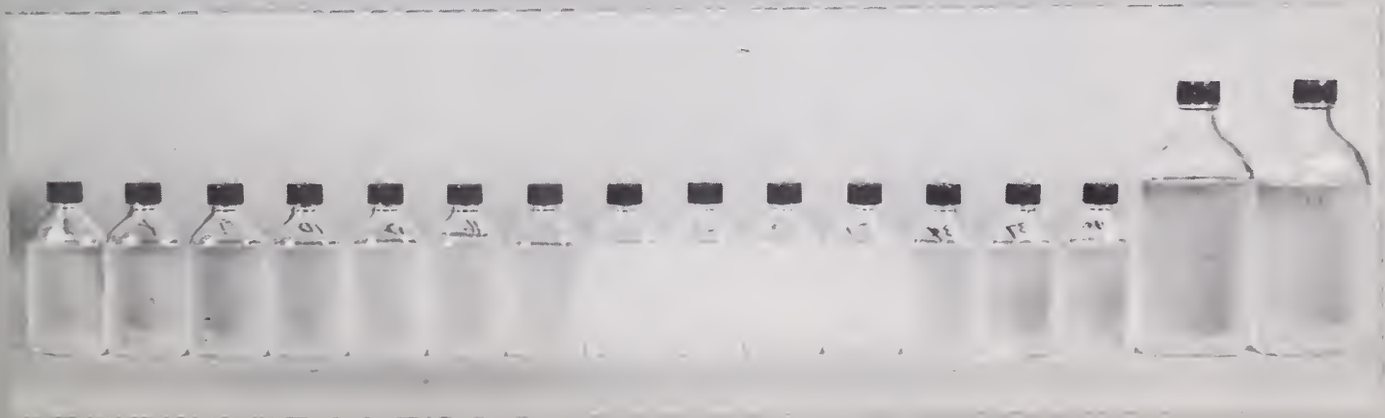
raying a water
upon which the

CRUDE VIRUS: The white line at the bottom of the jar is the actual virus material after preliminary screening.

2202-H61

END PRODUCT: The ultracentrifuge separates particles on the basis of density. Purified virus particles can be seen as an opaque suspension in the center four bottles.

2202-H90



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2202-H43

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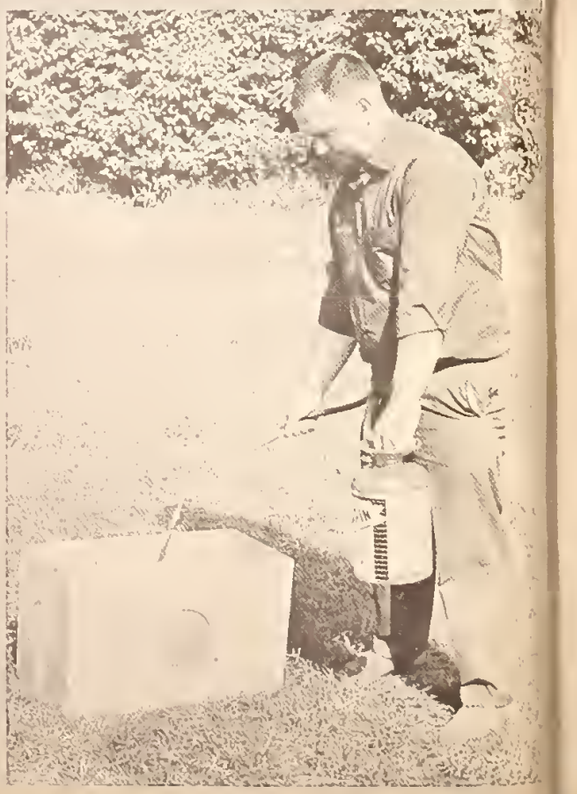
2202-H44

HARVESTING INSECTS: Pine sawfly cadavers are carefully picked from the pine twigs to which they are almost glued by the resinous pine material which they have ingested.

2202-H68

VIRUS APPLICATION: Larvae are infected spraying a water suspension of the virus onto pine foli upon which the insect will feed.

2202-H50



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2202-H61

END PRODUCT: The ultracentrifuge separates particles on the basis of density. Purified virus particles can be seen as an opaque suspension in the center four bottles.

2202-H90

To achieve the purest possible condition of virus, Forest Service scientists are sharing facilities with the Atomic Energy Commission at the AEC's Oak Ridge National Laboratory in Oak Ridge, Tenn. The Molecular Anatomy Program in Oak Ridge maintains a zonal ultracentrifuge to prepare ultra-pure influenza vaccines in quantity. This high-speed, high-volume device, which revolves 30-35,000 times each minute, has been utilized as a fast and economical insect virus purifier, as well. What emerges from the centrifuge in the process is a practically pure, white, concentrated polyhedrosis virus suspension. The approximately two million infected insects processed at Oak Ridge in the past two years have yielded about two pounds of this material. There is little waste. In fact, over 90 percent of what could be obtained, is recovered.

Unlike human viruses, insect viruses can be stored as a dry powder or as a liquid suspension for long periods of time without loss of potency. The rods of the sertifer virus develop in the insect cell's nucleus and are embedded in a protein capsule called a polyhedral inclusion body. This protein capsule protects the virus until application time and is the reason why these viruses can be stored for long periods of time.

An important part of the biotic control program at the Northeastern Forest Experiment Station's Hamden Lab is the determination of the safety of the virus material. Before backing mass production of the virus, the scientists will check its effects on beneficial types of life -- from humans to shellfish. Only after extensive testing and proof positive that it will not demonstrate the harmful aspects of the persistent pesticides, will it be allowed to go to work among the "better mousetraps" for controlling insect pests.

* * * * * * * *

HAMDEN SCIENTISTS WITH THE ULTRACENTRIFUGE: Forest Service scientists, (l. to r.) Dr. Horace M. Mazzone, Dr. Franklin B. Lewis, and William D. Rollinson, check a batch of material before purification by the special equipment at the Oak Ridge National Laboratory. 2202-H92